

Elucidation of *Olearia* species related to *O. paucidentata* (Asteraceae: Astereae)

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Abstract

Lander, N.S. Elucidation of *Olearia* species related to *O. paucidentata* (Asteraceae: Astereae). *Nuytsia* 18(1): 83–95 (2008). A group of south-west Western Australian endemic species related to *Olearia paucidentata* (Steetz) F.Muell. ex Benth. are distinguished, and an identification key and comprehensive descriptions of each are presented. *O. paucidentata* is lectotypified. *Eurybia lehmanniana* Steetz is re-instated at specific rank as *Olearia lehmanniana* (Steetz) Lander. Maps and notes on typification, distributions, etc. of each species are provided.

Introduction

Prior to the preparation of an account of *Olearia* Moench (Asteraceae) in the ongoing *Flora of Australia* series it is necessary to clarify the limits of a number of Western Australian species described by Joachim Steetz (1845) which are easily confused and have been difficult to distinguish.

My taxonomic studies of species currently recognized as *Olearia* are ongoing and it is highly likely that generic and infrageneric concepts will change as a result of molecular-phylogenetic studies (Cross *et al.* 2002). In the meantime, the group of species considered here is referred to *Olearia* sect. *Merismotriche* Archer ex Benth. (1867).

In general, the descriptive terminology used in this paper follows Radford (1986). For more specific terms applied to the Asteraceae I have followed Jeffrey (2007).

The descriptions in this paper were prepared using the DELTA suite of programs (Dallwitz 1980; Dallwitz *et al.* 1993) and edited to improve readability. The maps were prepared using the program *DIVA-GIS* (Hijmans *et al.* 2006). Distributions are summarised in terms of the *Interim Biogeographic Regionalisation for Australia (IBRA) version 6.1*, established by Department of the Environment, Water, Heritage and the Arts (2008) and the Western Australian Botanical Provinces delineated by Beard (1989).

Crisp (1983) has argued that where lectotypification has not yet been made, Preiss' specimens at LD annotated by Steetz have equal status as original material to those from Steetz's own herbarium, now at MEL. However, as Short (1983) has observed, those of the latter category are designated as new taxa by the word 'nobis!' after each name. Thus, in all such cases considered in the present paper,

specimens from MEL annotated by Steetz are selected as lectotypes. Further notes on specimens collected by Preiss can be found in Lander (1987).

Other than type material, only a brief selection of specimens examined of each species are listed here. A delimited text file containing label details of some 15,000 *Olearia* specimens from Australian and European herbaria examined in the course of my studies of this genus is available on request.

Key to *Olearia* species discussed in this paper

1. Leaves smooth to the touch; carpodium conspicuous
 2. Always at least some leaves with 1–4 lobes which extend as much as 3/4 distance to midrib; outer involucre bracts elliptic to ovate.....**O. paucidentata**
 - 2: All leaves entire; outer involucre bracts obovate to obtriangular
 3. Heads sessile or subsessile; ray florets 10–11.5 mm long; disc florets 4.2–5.0 mm long; anthers 2.0–2.2 mm long; filament collars 0.4–0.5 mm long; styles with arms 1.2–1.4 mm long; achenes 1.5–2.0 mm long × 0.8–1.4 mm wide; pappus with 10–12 short bristles (as well as longer ones).....**O. lehmanniana**
 - 3: Heads pedunculate; ray florets 5.1–9.0 mm long; disc florets 2.8–4.0 mm long; anthers 1.1–1.5 mm long; filament collars 0.1–0.3 mm long; styles with arms 0.7–1.0 mm long; achenes 0.6–0.7 mm long × 0.2–0.4 mm wide; pappus with 2–5 short bristles (as well as longer ones)..... **O. elaeophila**
- 1: Leaves distinctly rough to the touch, hispid to scabrous; carpodium conspicuous or inconspicuous
 4. Heads solitary; inner involucre bracts subglabrous to weakly hairy; ray florets 10.0–13.5 mm long, ligules 7.0–9.5 mm long; disc florets 5–6 mm long, the lobes 1.0–1.5 mm long; anthers 2.0–2.5 mm long, filament collars 0.3–0.4 mm long; achene with inconspicuous carpodium **O. strigosa**
 - 4: Heads borne in compound corymbs or panicles; inner involucre bracts densely hairy; ray florets 6.5–8.5 mm long, ligules 4.4–6 mm long; disc florets 3.5–4.2 mm long, lobes 0.4–0.6 mm long; anthers 1.6–1.7 mm long, filament collars 0.2–0.35 mm long; achene with a well-developed carpodium..... **O. muricata**

Olearia paucidentata (Steetz) F. Muell. ex Benth. *Fl. Austral.* 3: 485 (1867). — *Eurybia paucidentata* Steetz in Lehm. *Pl. Preiss.* 1: 420–421 (1845). — *Shawia paucidentata* (Steetz) Sch. Bip., *Polichia* 18–19: 174 (1861). — *Aster paucidentatus* (Steetz) F. Muell., *Fragm.* 5: 66 (1865, 1866). *Type*: In glareosia sylvae planitiei montis Greenmount, 26 April 1840, *L. Preiss* 84 (*lecto*, here designated: MEL 547137; *isolecto*: K).

Eurybia paucidentata var. *hispida* Steetz in Lehm. *Pl. Preiss.* 1: 420–421 (1845). *Type*: In glareosia sylvae planitiei montis Greenmount, 26 April 1840, *L. Preiss* 84 (*holo*: MEL 547137; *iso*: K).

Eurybia paucidentata var. *subracemosa* Steetz in Lehm. *Pl. Preiss.* 1: 420–421 (1845). *Type*: In planitie arenosa supra oppidulum Guildford, *L. Preiss* 80 p.p., 21 March 1839 (*lecto* here designated: MEL 1547136; *isolecto*: K, LD, P, S).

Eurybia paucidentata var. *glabrata* Steetz in Lehm. *Pl. Preiss.* 1: 420–421 (1845). *Type*: In solo humoso supra oppidulum Guildford ubique, 1 July 1839, *L. Preiss* 74 (*lecto*, here designated: MEL 1547134; *isolecto*: G, LD, MEL 1547135, S).

Olearia paucidentata var. *latifolia* Benth., *Fl. Austral.* 3: 485 (1867). *Types*: Swan River, J. Drummond 2/172, 1843 (*lecto*, here designated: K – photo PERTH; *isolecto*: MEL1547114, BM, G, P); Plantagenet and Stirling Range, [G. Maxwell s.n.], s. dat. (residual *syntype*: MEL1547113); Porongurup Ranges, G. Maxwell [as ‘Mx’], s. dat. (residual *syntype*: K – photo PERTH) – see *Typification* below.

Shrub to 1.2 m high; vegetative surfaces \pm resinous, glandular and arachnoid-lanate; stems cream, olive-green with purple tinges (mainly in axes), brown or grey; bark smooth. *Leaves* alternate and (sometimes) fasciculate, scattered or crowded, ascending or divergent, sessile, subsessile or petiolate, stem-clasping; petiole 2 mm long; lamina flat, heteromorphic, elliptic, linear, obovate, ovate, spatulate, triangular or cuneate, 1–35 mm long \times 0.5–10.0 mm wide, concolorous or discolorous, dark green abaxially, grey-green adaxially, herbaceous, smooth to the touch but with shiny colliculate surfaces, abaxially subglabrous to weakly hairy with multicellular, uniseriate, simple and biseriate, vesicular trichomes, adaxially glabrous to subglabrous with multicellular, uniseriate, simple trichomes; base acute, attenuate or truncate; margin revolute or flat, irregularly lobed to entire (always at least some leaves 1–4-lobed, the lobes sometimes extending as much as 3/4 distance from outer margin of lamina to midrib); apex acute, obtuse or rounded, mucicous or mucronulate. *Heads* terminal, in panicles or (occasionally) in simple leafy corymbs, shortly pedunculate, conspicuously radiate, 10–25 mm wide; disc 4–10 mm in diameter; peduncles to 30 mm long \times 0.5–1.2 mm in diameter; peduncular bracts absent or 1–4 and then distinct from or grading into those of the involucre. *Involucre* conic, turbinate or cup-shaped; involucre bracts 4–6-seriate, 2.5–4.3 mm long \times 0.6–0.8 mm wide. Outer involucre bracts cymbiform or flat, elliptic or ovate, glabrous to weakly hairy abaxially with unicellular, simple and multicellular, uniseriate, simple and biseriate, vesicular trichomes; stereome yellow, green or brown; margin cartilaginous, ciliate; apex acute or rounded, the same colour as the stereome or red. Inner involucre bracts cymbiform or flat, elliptic, abaxially glabrous with unicellular and multicellular, biseriate, vesicular (sometimes glandular trichomes; stereome yellow, green or brown; margin cartilaginous, fimbriate; apex acute or rounded, the same colour as the stereome or faintly red. *Receptacle* convex. *Ray florets* 12–16, uniseriate, 7–9 mm long, white, mauve, blue or purple; floral tube glabrous to weakly hairy abaxially with biseriate simple and occasionally unicellular trichomes; ligule elliptic, obovate or oblong, 4.6–6 mm long \times 1.3–2 mm wide, glabrous to subglabrous with multicellular, uniseriate and biseriate, simple trichomes; stylar arms ligulate, 1.1–1.4 mm long \times 0.1–0.15 mm wide. *Disc florets* 13–56, mauve or yellow (although sometimes only the styles are yellow), narrowly infundibular, 3.5–4.0 mm long, subglabrous; trichomes biseriate, simple; lobes 5, 0.8–1.3 mm long, acute. Anthers 1.4–1.8 mm long; basal lobes acute or fused to the filament collar, 0.2 \times the length of the filament collar; filament collar 0.3 mm long; sterile appendage ovate. Stylar arms 0.75–1.25 mm long \times 0.2–0.3 mm wide; sterile appendage ligulate or sometimes half-clavate, with botuliform or cylindrical sweeping-hairs. *Achenes* ellipsoid, botuliform or obovoid, 1.0–1.2 mm long \times 0.4–0.5 mm wide, green, yellow or brown, weakly to densely sericeous or strigillose with duplex hairs and biseriate, vesicular trichomes; venation \pm distinct; ribs 4; base acute or truncate; carpopodium conspicuous; apex acute or truncate. *Pappus* 0.8 \times the length of the tubular florets; bristles uniseriate, white or straw-coloured, barbellate; long bristles 21–33; short bristles 10–16.

Selected specimens examined (from a total of 355). WESTERN AUSTRALIA: Pallinup Riverside, E of Albany, 15 Feb. 1982, E.J. Croxford 1787 (PERTH 4468821); Yandegin, 1890, A. Eaton s.n. (MEL); Lesueur National Park, 22 Mar. 1993, B. Evans WE 491 (PERTH 07719744); King George Sound, s. dat., C.G.F. von Hochstetter s.n. (P); 1.6 km W of Wongan Hills on Wongan Hills – Piawaning Rd, 14 May 1980, K.F. Kenneally 7201 (PERTH 529281); Cape Leeuwin, 27 Dec. 1962, F. Lullfitz 2051 (PERTH 00529354); Busselton, Mar. 1898, A. Morrison 8591 (K); Fremantle, s. dat., A.F. Oldfield s.n. (MEL - 2 sheets); Boranup, 8 km NW of Karridale, Nov. 1982, A. Strid 21396 (CO, K, MEL); Point Nuyts, near bridge, Oct. 1968, J.W. Wrigley CBG 036515 (CBG).

Distribution. Geraldton Sandplains, Swan Coastal Plain, Jarrah Forest, Warren, Avon Wheatbelt, Mallee, Coolgardie and Esperance Plains Bioregions in the South-west Botanical Province of Western Australia (Figure 1).

Flowering period. Throughout the year.

Habitat. In low to tall open forest (Jarrah, Karri, Marri, Wandoo), in loam, clay and red to white sand, over limestone, granite and gneiss.

Conservation status. Widespread and common in south-west Western Australia.

Typification. The name *Eurybia paucidentata* Steetz is legitimately published. However, Steetz named and described three variants of this species, to none of which he gave the varietal epithet *paucidentata*; nor does he cite a specimen with his description of the species itself. Thus *E. paucidentata* is lectotypified above by the type of *E. paucidentata* var. *hispida*.

Specimens bearing *Plantae Preissianae* number 80 variously represent types of *Eurybia elaeophila* DC. and *E. paucidentata* var. *subracemosa* Steetz. Those of the former are generally annotated *Preiss* 80a; those of the latter simply *Preiss* 80. The mixed nature of this collection is further evidenced by Preiss' field numbers attached to several of these specimens. A specimen belonging to *Olearia paucidentata* held at K is numbered *J.A.L. Preiss* 32. Otherwise its label data is fully consistent with that of the lectotype (LD) and isolectotype (MEL) of *E. paucidentata* var. *subracemosa* cited above. This specimen would appear to be from amongst specimens bearing Preiss' field numbers purchased by William Hooker directly from the collector prior to the distribution of his collections bearing *Plantae Preissianae* numbers (Lander 1987: 8). Thus it is considered here to be an isolectotype of *E. paucidentata* var. *subracemosa*.

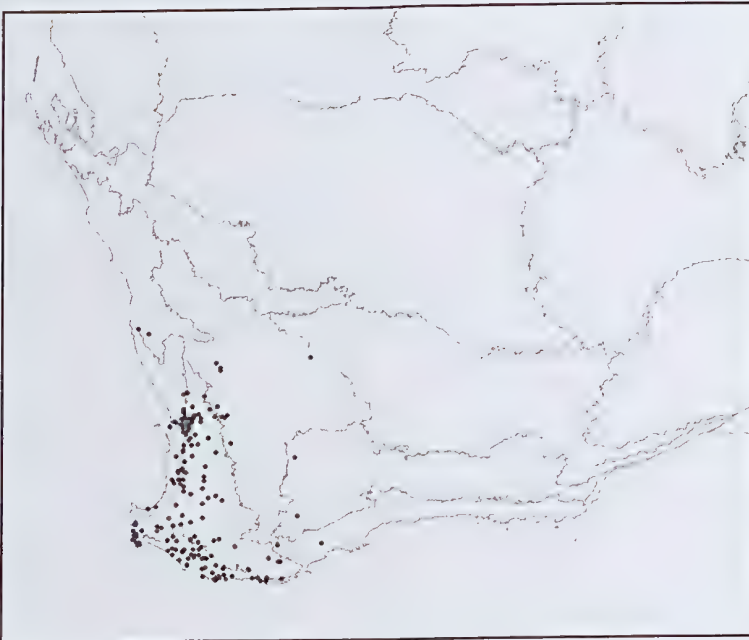


Figure 1. Distribution of *Olearia paucidentata* (●).

Original material of *Olearia paucidentata* var. *latifolia* held at MEL, namely *Maxwell* (MEL 1547113) and *Drummond* 172 (MEL 1547114) have both been annotated by Bentham with his customary 'B' and are thus here designated as residual syntypes.

Of his *Eurybia paucidentata* var. *hispida*, Steetz (*loc. cit.*) notes 'Unicum tantum specimen exstat, et hoc insuper mancum'. Only a single, incomplete specimen exists. Thus the Preiss specimen at MEL is here considered to be the holotype of this name. An isotype (unseen by Steetz) is at K.

Affinities. This species was included by Bentham (1867) in *Olearia* sect. *Merismotriche* where it bears a strong resemblance to both *O. elaeophila* and to *O. lehmanniana*. These three species are broadly sympatric north of Perth and have been much confused in herbarium collections.

Olearia paucidentata differs from *O. elaeophila* in its vestiture which is glandular or strigose rather than arachnoid or lanate; leaf lamina with margins both entire and irregularly lobed (i.e. always at least some leaves with 1–4 lobes sometimes extending as much as 3/4 distance to the midrib from the outer margin of the lamina) rather than always entire and never toothed or lobed; outer involucre bracts which are elliptic or ovate rather than triangular; pappus with 10–16 rather than 2–5 short bristles.

Olearia paucidentata differs from *O. lehmanniana* in its vestiture which is glandular or strigose rather than arachnoid or lanate; heads borne in simple corymbs or panicles rather than solitary or in racemes, and pedunculate rather than sessile to subsessile; outer involucre bracts which are elliptic or ovate rather than obovate or triangular; ray florets which are 7–9 mm rather than 10.0–11.5 mm long, with ligules 4.6–6.0 mm rather than 7.5–8.5 mm long; disc florets 3.5–4.0 mm rather than c. 4.2–5.0 mm long, with anthers 1.4–1.8 mm rather than 2.0–2.2 mm long, and filament collars c. 0.3 mm rather than 0.4–0.5 mm long; achenes 1–1.2 × 0.4–0.5 mm rather than 1.5–2 × 0.6–7.0 mm; pappus uniseriate rather than biseriate.

Olearia elaeophila (DC.) F.Muell. ex Benth., *Fl. Austral.* 3: 484 (1867). — *Eurybia elaeophila* A.Cunn. ex DC., *Prod.* 5: 269 (1836). — *Aster elaeophilus* A.Cunn. ex DC., *loc. cit.*, *pro syn. (nom. inval.)* — *Aster heleophilus* (DC.) F.Muell., *Fragm.* 5: 66 (1865, 1866). — *Olearia heleophila* F.Muell., *loc. cit.*, *pro syn. (nom. inval.)* *Type:* ... in paludosis ad ripa alcus dicti Lagoon in sinu Regis Georgii ad oram merid.-occid. Novae Hollandiae, 9 January 1818, *A. Cunningham* 37 (*holo:* G-DC).

Eurybia affinis Steetz in Lehm. *Pl. Preiss.* 1: 421–422 (1845). — *Shawia affinis* (Steetz) Sch.Bip., *Pollichia* 18–19: 174 (1861). *Type:* In planitie arenosa supra oppidulum Guildford, 21 March 1839, *L. Preiss* 80 *ex parte (lecto)*, here designated: MEL1547097; *isolecto:* K– photo PERTH, LD, MEL1547085, MEL1547095, P).

Eurybia paniculata Steetz, in Lehm. *Pl. Preiss.* 1: 422–423 (1845). — *Shawia steetzii* Sch.Bip., *Pollichia* 18–19: 174 (1861), non *Shawia paniculata* J.R.Forst. & G.Forst., *Char. Gen. Pl.*: 95, t. 48 (1776). — *Aster preissii* F.Muell., *Fragm.* 5: 66 (1865, 1866), *pro syn. (nom. inval.)* *Type:* In solo sublimoso vallis montis Warriup, districtus Hay, February 1841, *L. Preiss* 81 (*lecto*, here designated: MEL1547098; *isolecto:* K, LD, MEL1547099, P, S).

Shrub to 0.5 m high; vegetative surfaces glandular- and sparsely arachnoid-hairy to lanate; stems ascending, green or brown; bark smooth. *Leaves* alternate and ± fasciculate, scattered, appressed, ascending or inclined, sessile, subsessile or petiolate, clasping; petiole to 2 mm long; lamina incurved, recurved (and sometimes falcate) or flat, linear or occasionally elliptic, 2–30 mm long × 0.25–2.5 mm

wide, concolorous, yellow, green or grey, herbaceous, smooth, abaxially glabrous to subglabrous with unicellular trichomes and scattered multicellular, uniseriate, simple and multicellular, biseriate, vesicular trichomes, adaxially glabrous to subglabrous with extremely few, unicellular and multicellular, uniseriate, simple trichomes; base acute to truncate; margin entire, revolute or involute; apex acute, mucous or mucronulate. *Heads* terminal, in panicles or racemes, pedunculate, conspicuously radiate, 8–17 mm in diameter; disc 5–8 mm in diameter; peduncle 4–10 mm long \times 0.25–0.75 mm in diameter; peduncular bracts up to 4, grading into those of the involucre. *Involucre* conic or hemispheric; involucre bracts 3–6-seriate, 1.2–3.5 mm long \times 0.6–1.0 mm wide, cymbiform or flat. Outer involucre bracts triangular, abaxially glabrous to densely hairy with unicellular and multicellular, uniseriate, simple trichomes; stereome yellow or green; margin membranous, fimbriate or ciliate; apex acute, pinkish red or faint orange. Inner involucre bracts cymbiform or flat, elliptic or ovate, abaxially glabrous to densely hairy with unicellular and multicellular, uniseriate, simple and biseriate, vesicular trichomes; margin membranous, entire or fimbriate; apex acute, pinkish red. *Receptacle* flat or convex. *Ray florets* 10–17, uniseriate, 5.1–9 mm long, white or blue; floral tube abaxially subglabrous or weakly hairy with multicellular, biseriate, simple trichomes; ligule linear, elliptic or obovate, 3.5–7.5 mm long \times 0.9–1.9 mm wide, glabrous; stylar arms ligulate, 0.7–1.5 mm long \times 0.1 mm wide. *Disc florets* 7–18, yellow or (rarely) violet, infundibular or campanulate (one specimen greatly swollen basally), 2.8–4.0 mm long, subglabrous with multicellular, biseriate, simple trichomes; lobes 5, 0.8–1.0 mm long, acute. Anthers 1.1–1.5 mm long; basal lobes rounded or fused to the filament. Stylar arms 0.7–1.0 mm long \times 0.1–0.2 mm wide; sterile appendage half-clavate or ligulate, with botuliform sweeping-hairs. *Achene* ellipsoid, botuliform or obovoid, 0.8–1.4 mm long \times 0.2–0.4 mm wide, orange-yellow or brown, densely hairy, with duplex hairs and \pm strigillose multicellular, biseriate, vesicular trichomes; venation indistinct; base acute or truncate; carpopodium conspicuous; apex truncate. *Pappus* equal or subequal in length to the tubular florets, uniseriate or biseriate; bristles white or straw-coloured, sometimes orange at base, barbellate; long bristles 18–29; short bristles 2–5.

Selected specimens examined (from a total of 96). WESTERN AUSTRALIA: Walpole National Park, 11 Apr. 1989, *A.R. Annels* 707 (PERTH 02654857); Bunbury, Mar. 1903, *C.R.P. Andrews s.n.* (PERTH 00450499); Mt Lesueur, on track from Jurien Bay Rd, 21 Feb. 1970, *T.E.H. Aplin* 2988 (PERTH 00674761); West Perth, *s. dat.*, *W.E. Blackall s.n.* (PERTH 00450464); King George Sound [as 'King George III Sound'], Dec. 1801, *R. Brown* 2252 (BM); Cape Naturaliste, *s. dat.*, [*R.*] *Collie s.n.* (K); Cape Leuwin, *s. dat.*, [*R.*] *Collie s.n.* (K); Busselton, *s. dat.*, *A. & E. Pries s.n.* (MEL); Toolibin townsite, 12 Mar. 1986, *L. Silvester s.n.* (PERTH 00803278); Dingo Rock Reserve, 6 miles [9.7 km] W of Manmanning, 14 June 1985, *B.H. Smith* 583 (AD, CBG, HO, MEL, NSW, PERTH 799076); Point Ann [as Point Anne], Fitzgerald River National Park, 21 May 1991, *R.T. Wills s.n.* (PERTH 06424198).

Distribution. Geraldton Sandplains, Swan Coastal Plain, Jarrah Forest, Avon Wheatbelt, Warren, and Esperance Plains Bioregions in the South-west Botanical Province of Western Australia (Figure 2).

I have tentatively identified a specimen at K collected by Richard Helms at Victoria Desert Camp 56 (18 September 1891) as this species, though it seems highly dubious at this locality and it is likely that the label information is in error.

Habitat. Amongst sedge-land, heath, low, closed shrubland, low, open woodland and low, open forest, in winter-wet depressions, on flats, river foreshores and gentle slopes or around rocky outcrops, in peat, gravelly sand and sandy clay over laterite and around granite outcrops.

Flowering period. April and May.

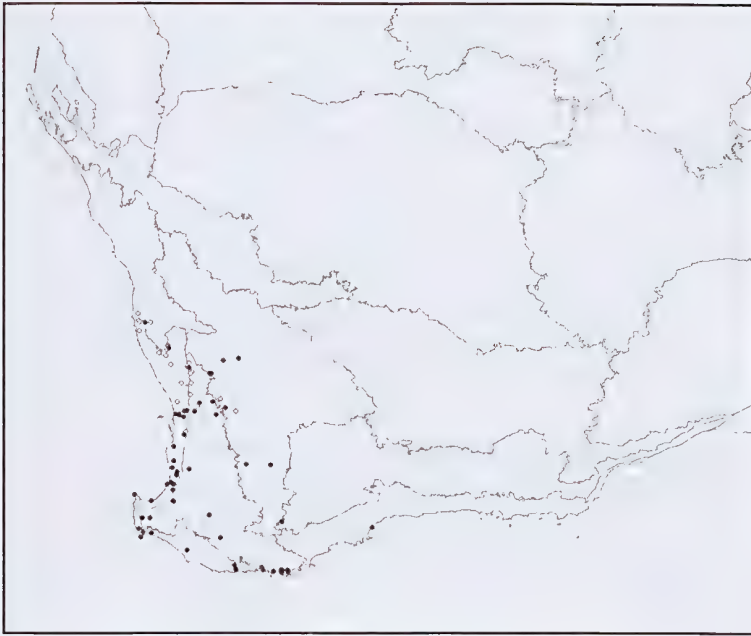


Figure 2. Distribution of *Olearia elaeophila* (●) and *O. lehmanniana* (○).

Conservation status. Widespread and common in south-west Western Australia.

Typification. The isoelectotypes of *Eurybia affinis* Steetz at K and MEL1547085 bear the field location number 32 used by Preiss rather than the formal collection numbers used in *Plantae Preissianae*.

Affinities. This species was included by Bentham (1867) in *Olearia* sect. *Merismotriche* where it appears most similar to *O. paucidentata* (see above for distinguishing features) and *O. lehmanniana* (see below). These three species are broadly sympatric north of Perth and have been much confused in herbarium collections.

Olearia lehmanniana (Steetz) Lander, *comb. nov.* — *Eurybia lehmanniana* Steetz in Lehm. *Pl. Preiss.* 1: 422 (1845). — *Shawia lehmanniana* (Steetz) Sch. Bip., *Pollichia* 18–19: 174 (1861). — *Aster lehmannii* F. Muell., *Fragm.* 5: 66 (1865, 1866), *pro syn. (nom. inval.)* — *Olearia heleophila* var. *major* Benth., *Fl. Austral.* 3: 484 (1867). *Type:* In arenosis inter frutices supra oppidulum Perth, 14 April 1839, L. Preiss 79 (*lecto*, here designated: MEL1547092; *isoelecto:* CO, FL, FL-W, G-2 specimens, K – with field number 147, L, LD, MEL 1547093 & 1547094 & 1547096, P, S – *n.v.*, WRSL).

Olearia conspicua Lander & S. Harris ex Paczkowska & Chapman, West. Austral. Fl.: *Descr. Cat.* p. 168 (2000) *nom. nud.*

Shrub to 1.3 m high × 0.3 m wide; vegetative surfaces glandular and arachnoid hairy to lanate; stems green, brown or grey; bark smooth. *Leaves* alternate and sometimes fasciculate, scattered, appressed, ascending or inclined, sessile and stem-clasping, subsessile or petiolate; petiole to 1 mm long; lamina incurved, recurved or flat, elliptic or linear, sometimes falcate, 2–20 mm long × 0.5–2.0 mm wide, concolorous, yellow, green or grey, herbaceous, smooth, abaxially densely hairy with unicellular, and multicellular, uniseriate, simple and biseriate, vesicular trichomes, adaxially subglabrous to weakly

hairy with unicellular and multicellular, uniseriate, simple trichomes; base acute or truncate; margin flat or revolute, entire; apex acute, mucous or mucronulate. *Heads* terminal, solitary or in racemes, sessile or subsessile, conspicuously radiate, 9–24 mm in diameter; disc 7–14 mm in diameter; involucre conic; involucre bracts 5–7-seriate, 2.5–4.7 mm long \times 0.8–1.2 mm wide. Outer involucre bracts flat, obovate or triangular, abaxially subglabrous to densely hairy with unicellular, multicellular, uniseriate, simple and biseriate, vesicular trichomes; stereome green or brown; margin chartaceous, entire, fimbriate or ciliate; apex acute, the same colour as the stereome or pinkish red. Inner involucre bracts flat, elliptic; abaxially glabrous to densely hairy with unicellular and multicellular, uniseriate, simple and biseriate, vesicular trichomes; stereome yellow or green; margin membranous, fimbriate; apex acute, purple or pinkish red. *Receptacle* flat or convex. *Ray florets* 9–16, uniseriate, 10.0–11.5 mm long, pale mauve; floral tube weakly to densely hairy abaxially, with biseriate, simple trichomes.; ligule elliptic or obovate, 7.5–8.5 mm long \times 1.7–2.5 mm wide, glabrous; staminodes present or absent; stylar arms ligulate, 1.0–1.2 mm long \times 0.08–0.20 mm wide. *Disc florets* 17–20, infundibular, 4.2–5.0 mm long, subglabrous, with biseriate, simple trichomes; lobes 5, 1.2–1.5 mm long, acute. Anthers 2.0–2.2 mm long; basal lobes acute, rounded or tailed or fused to the filament collar, 0.1–0.4 \times the length of the filament collar; filament collar 0.4–0.5 mm long; sterile appendages ovate or triangular. Stylar arms 1.2–1.4 mm long \times 0.2–0.3 mm wide, half-clavate or ligulate, with botuliform sweeping-hairs. *Achenes* ellipsoid, 1.5–2.0 mm long \times 0.6–0.7 mm wide, orange-brown, densely glandular-hairy or strigillose, with duplex hairs and biseriate, vesicular trichomes; venation indistinct; base acute; carpodium conspicuous; apex acute. *Pappus* biseriate, with white or straw-coloured, barbellate bristles; long bristles 28–30; short bristles 10–12.

Selected specimens examined (from a total of 26). WESTERNAUSTRALIA: Mundijong, 12 May 1980, R.J. Cranfield s.n. (PERTH 00450359); Reserve 24496, 8 km E of Leeman, 20 Mar. 1981, E.A. Griffin & M.I. Blackwell 3056 (PERTH 450545); Jurien Bay, S of River Loop Rd, 18 June 2005, R. Snook HRTA 153 (PERTH 07267959) Hills, 3 June 2005, A. Sole & H. Green NP18 (PERTH 07321473).

Distribution. Geraldton Sandplains, Swan Coastal Plain, Avon Wheatbelt and Jarrah Forest Bioregions in the South-west Botanical Province of Western Australia (Figure 2).

Habitat. Amongst swamp, low heath, shrubland, woodland, forest, on flats, river banks, slopes, and ridges; in gravely clay, loam, silt and sand; over limestone, granite and laterite.

Flowering period. February to April.

Conservation status. Widespread and common in south-west Western Australia.

Typification. The isoelectotype of *Eurybia lehmanniana* Steetz at K bears the field location number 147 used by Preiss rather than the formal collection numbers used in *Plantae Preissianae*.

Affinities. This species was subsumed by Bentham (1867) under *Olearia paucidentata* which he placed in section *Olearia* sect. *Merismotriche*. For distinguishing features between these two species see above.

Olearia lehmanniana is, perhaps, most similar to *O. elaeophila* from which it can be distinguished by its heads which are sessile or subsessile rather than pedunculate; ray florets which are 10.0–11.5 mm rather than 5.1–9.0 mm long; disc florets which are c. 5 mm rather than 2.8–4.0 mm long, with lobes c. 1.2 mm rather than 0.8–1.0 mm long, anthers 2.0–2.2 mm rather than 1.1–1.5 mm long, filament

collars 0.4–0.5 mm rather than 0.1–0.3 mm long, and styles with arms 1.2–1.4 rather than 0.7–1.0 mm long; achenes which are 1.5–2 × 0.8–1.4 mm rather than 0.6–0.7 × 0.2–0.4 mm; pappus which has 10–12 rather than 2–5 short bristles.

These three species are broadly sympatric north of Perth and have been much confused in herbarium collections.

Olearia strigosa (Steetz) Benth., *Fl. Austral.* 3: 485 (1867). — *Eurybia strigosa* Steetz, Lehm. *Pl. Preiss.* 1: 419–420 (1845). — *Shawia strigosa* (Steetz) Sch.Bip., *Pollichia* 18–19: 174 (1861). — *Aster steetzii* F.Muell., *Fragm.* 5: 66 (1865) non *Aster strigosus* Harvey & Sond., *Fl. Cap.* 3: 83 (1865). — *Olearia steetzii* F.Muell., *loc. cit.*, *pro syn.*, *nom. inval.* *Type:* In arenosis sylvae prope fluvium Vasse-river, 17 December 1839, *L. Preiss* 83 (*lecto*, here designated: MEL1547181; *isolecto*: G, LD, MEL1547180, S).

Eurybia aspera Steetz, in Lehm. *Pl. Preiss.* 1: 420 (1845). — *Shawia aspera* (Steetz) Sch.Bip., *Pollichia* 18–19: 174 (1861). *Type:* [Specimen unicum inveni in herbario Preissiano sine numero et schedula], *L. Preiss s.n.* (*holo*: MEL1547138).

Shrub to 0.5 m high × 0.3 m wide; vegetative surfaces hispid; stems cream, green (sometimes pale), brown or grey; bark smooth. *Leaves* alternate, scattered, appressed, ascending or inclined, sessile to subsessile, stem-clasping; petiole (when present) to 1 mm long; lamina incurved, recurved or flat, linear; 2.5–18.0 mm long × 1.0–2.5 mm wide, concolorous, yellow, green or grey, herbaceous, abaxially subglabrous to densely hairy with unicellular, multicellular, uniseriate, simple and biseriate, vesicular trichomes, adaxially subglabrous with unicellular and multicellular, uniseriate, simple trichomes; base acute or truncate; margin revolute, entire; apex acute, mucicous. *Heads* terminal, solitary or in racemes, pedunculate, conspicuously radiate, 11–20 mm in diameter; disc 7–12 mm in diameter. Peduncle to 22 mm long × 0.5–1 mm in diameter; peduncular bracts absent or few to many, grading into those of the involucre. *Involucre* conic or hemispheric; involucre bracts 3–5-seriate, 2.5–6.0 mm long × 0.5–1.8 mm wide. Outer involucre bracts cymbiform or flat, linear, elliptic or triangular, abaxially subglabrous to densely hairy with unicellular, multicellular, uniseriate, simple and biseriate, vesicular trichomes; stereome yellow or green; margin chartaceous, membranous or herbaceous, entire or ciliate; apex acute, the same colour as the stereome. Inner involucre bracts cymbiform or flat, linear; abaxial vestiture glabrous to densely hairy with unicellular, multicellular, uniseriate, simple and biseriate, vesicular trichomes; stereome green or yellow; margin chartaceous or membranous, fimbriate, entire or ciliate; apex acute, the same colour as the stereome. *Receptacle* convex. *Ray florets* 7–11, uniseriate, 10.0–13.5 mm long; floral tube glabrous to densely hairy abaxially, with unicellular, multicellular, uniseriate and biseriate, simple trichomes; ligule elliptic or obovate, 7.0–9.5 mm long × 1.8–2.5 mm wide, glabrous; *stylar arms* filiform or ligulate, 1–2 mm long × 0.1–0.2 mm wide. *Disc florets* 9–30, infundibular or conic, 5–6 mm long, glabrous to densely hairy with multicellular, biseriate, simple trichomes; lobes 5, 1.0–1.5 mm long, acute. Anthers 2.0–2.5 mm long; basal lobes acute, 0.1–0.2 × the length of the filament collar; filament collar 0.3–0.4 mm long; sterile appendage triangular (occasionally almost linear). *Stylar arms* 1–2 mm long × 0.1–0.3 mm wide; sterile appendage half-clavate or ligulate, with botuliform sweeping-hairs. *Achene* ellipsoid, botuliform or obovoid, 1.1–2.0 mm long × 0.2–0.4 mm wide, green, yellow, brown or grey, densely sericeous, with duplex hairs and multicellular, biseriate, vesicular trichomes; venation indistinct; base acute or truncate; carpodium inconspicuous; apex acute or truncate. *Pappus* 0.8–1.0 × the length of the tubular florets, uniseriate or biseriate; bristles white or straw-coloured, barbellate; long bristles 30–56; short bristles 4–10(–20).

Other specimens examined. WESTERN AUSTRALIA: Carburnup River crossing on road from Busselton to Margaret River, 21 Jan. 1979, *B. Barnsley* 820 (CBG, PERTH 789216); Dunsborough, Dec. 1963, *J.S. Beard* 3145 (KPBG); Marri Reserve 28683, Cape Naturaliste Road, Dunsborough, 15 Dec. 2003, *H. Cole & D. Carter* 658 (PERTH 06837727); between Wagerup & Yarloop, 9 Apr. 1955, *J.W. Green* 318 (PERTH 00676438); Kemp Road, base of Whicher Range, 28 Jan. 2004, *G.J. Keighery* 16441 (PERTH 07188293); *s. loc.*, 1860, *G. Maxwell s.n.* (PERTH 01622595); Ludlow, 23 Mar. 1898, *A. Morrison s.n.* (P); Busselton, Mar. 1898, *A. Morrison* 8591 (ED, K, P); Harvey River, Dec. 1877, *F.[J.H.] Mueller* (MEL); Coolilup [as Coolicup], 29 Dec. 1939, *T.N. Stoate s.n.* (PERTH 00675962 & 00675970); Boyanup, May 1912, *F. Stoward* 145 (NSW).

Distribution. Restricted to the southern part of the Swan Coastal Plain Bioregion in the South-west Botanical Province of Western Australia (Figure 3).

Habitat. Amongst low, open woodland with understorey of herbs, low and tall sedges, on undulating flats, in grey sandy clay and pale brown loam.

Flowering period. December to May.

Conservation status. Despite its restricted distribution and infrequent collection this species does not appear to be rare or threatened.

Typification. The specimen taken to be the holotype of *Eurybia aspera* is from the personal herbarium of Steetz (now at MEL) and is the only one encountered labelled with this name by Steetz himself. On the sheet Steetz notes that this specimen was segregated from Preiss' collection of *Eurybia paucidentata* var. *hispida*, namely *Preiss* 84 from Greenmount.



Figure 3. Distribution of *Olearia strigosa* (●) and *O. muricata* (○).

Affinities. This species was included in *Olearia* section *Merismotriche* by Bentham where it appears most similar to *O. muricata*, from which it can be distinguished by its heads which are solitary rather than borne in compound corymbs or panicles; its inner involucre bracts which are subglabrous or weakly hairy rather than densely hairy; its ray florets which are 10.0–13.5 mm rather than 6.5–8.5 mm long, with ligules 7.0–9.5 rather than 4.4–6 mm long; its disc florets which are 5–6 mm rather than 3.5–4.2 mm long, with lobes 1.0–1.5 rather than 0.4–0.6 mm long, and anthers 2.0–2.5 rather than 1.6–1.7 mm long with filament collars 0.3–0.4 rather than 0.20–0.35 mm long; and its achene with carpopodium inconspicuous rather than well-developed. From Figure 3 it can be seen that these two species are decidedly allopatric, separated (but for a single specimen of *O. muricata*) by the Jarrah Forest Bioregion.

Olearia muricata (Steetz) Benth., *Fl. Austral.* 3: 484–485 (1867). — *Eurybia muricata* Steetz, in Lehm. *Pl. Preiss.* 1: 423 (1845). — *Shawia muricata* (Steetz) Sch.Bip. (1861: 174). — *Aster muricatus* (Steetz) F.Muell., *Fragm.* 5: 66 (1865, 1866). *Type:* In promontorio Cape-Riche, [34° 36' S, 118° 47' E], November 1840, *L. Preiss* 82 (*lecto*, here designated: MEL1547133; *isolecto*: G, LD, MEL1547131).

Eurybia leptophylla Turcz., *Bull. Soc. Imp. Natural. Moscou* 24(1): 171 (1851). — *Shawia leptophylla* (Turcz.) Sch.Bip., *Pollichia* 18–19: 175 (1861). *Type:* Swan River, *s. dat.*, *J. Drummond* 3/127 (*holo*: KW; *iso*: P; possible *iso*: CGE, K, MEL681595, P, PERTH 00529540).

Shrub to 1 m high; vegetative surfaces scabrous; stems green or brown; bark smooth or plated. *Leaves* alternate, fasciculate or whorled, scattered or crowded, appressed, ascending or inclined, sessile to subsessile, stem-clasping or decurrent; lamina recurved to flat, linear, triangular to (sometimes) narrowly elliptic, 2–10 mm long × 0.7–2.0 mm wide, concolorous, olive or green, herbaceous, smooth (but with shiny colliculate surfaces), abaxially densely hairy with unicellular, multicellular, uniseriate, simple and biseriate, vesicular trichomes, adaxially subglabrous to weakly hairy with unicellular, multicellular, biseriate, vesicular or simple trichomes; base truncate or (occasionally) acute; margin entire, revolute or flat; apex acute or rounded, muticous. *Heads* terminal, in panicles or (occasionally) in leafy compound corymbs, pedunculate, conspicuously radiate, 8–20 mm in diameter; disc 7–12 mm in diameter; peduncle to 25 mm long × 0.50–0.75 mm in diameter; peduncular bracts absent or up to 4, grading into those of the involucre. *Involucre* conic, involucre bracts 4-seriate, 1.8–4.8 mm long × 0.5–0.8 mm wide. Outer involucre bracts cymbiform or flat, linear, elliptic, ovate or oblong, abaxially subglabrous to densely hairy, with unicellular, multicellular, uniseriate, simple, biseriate, simple and biseriate, vesicular trichomes; stereome green; margin membranous to herbaceous, entire; apex acute, the same colour as the stereome. Inner involucre bracts cymbiform or flat, linear, obovate or oblong, abaxially subglabrous to densely hairy with unicellular, multicellular uniseriate, simple and biseriate, vesicular trichomes; stereome yellow or green; margin membranous, entire or fimbriate; apex acute, the same colour as the stereome or pale red. *Receptacle* flat or convex. *Ray florets* 8–10, uniseriate; 6.5–8.5 mm long; white or pale mauve; floral tube abaxially densely hairy, with biseriate, simple trichomes; ligule elliptic, 4.4–6.0 mm long × 1.8 mm wide, glabrous; stylar arms ligulate, 0.6–1.0 mm long × 0.1 mm wide. *Disc florets* 11–16, yellow (some purple-tipped), infundibular, 3.5–4.2 mm long, subglabrous, with biseriate, simple and vesicular trichomes; lobes 5, 0.4–0.6 mm long, acute. Anthers 1.6–1.7 mm long; basal lobes acute, 0.10–0.25 × the length of the filament collar; filament collar 0.20–0.25 mm long; sterile appendage ovate or triangular. Stylar arms 0.7–1.0 mm long × 0.1–0.2 mm wide, half-clavate, with botuliform sweeping-hairs. *Achene* ellipsoid or obovoid, 1.3–1.6 mm long × 0.4–0.5 mm wide, green, yellow or brown, densely sericeous, with duplex hairs; venation indistinct; base acute; carpopodium conspicuous; apex acute or truncate. *Pappus* 0.9 × the length of the tubular florets, uniseriate or biseriate; bristles white or straw-coloured, barbellate; long bristles 30–37; short bristles 5–20.

Selected specimens examined (from a total of 46). WESTERN AUSTRALIA: Bebenorin Hill, 11 km NE, 17 Dec. 1989, *W. Archer* 1712891 (PERTH 1698761); Coolgardie, 66 km SW, on Queen Victoria Rock road, 31 Jan. 1979, *B. Barnsley* 1028 (CBG, PERTH 789232); Lake Mears Nature Reserve, 12 Feb. 1998, *R. Davis* 5089, (PERTH 05027411); Kondut, 2 miles [3.2 km] S, 10 Jan. 1960, *A.S. George* 503 (PERTH 00528722); Cape Riche, Mar. 1854, *W.H. Harveys.n.* (K); Westdale Hill, Wandoo Conservation Park, Beverley, 6 Feb. 2000, *M. Hislop, F. & J. Hort* 926 (PERTH 05541336); Wongan Hills, 15 Feb. 1975, *K.F. Kenneally* 2432, (CANB, PERTH 1214004); Boorabin, Jan. 1906, *A. Morrison* 16011 (K); Woogenilup Rd, off Chester Pass, July 1969, *S.P. Pfeiffer* 25 (PERTH 00674745); Salmon Gums, 36 km S, Mar. 1983, *A. Strid* 22415 p.p. (G, K, MEL).

Distribution. Jarrah Forest, Avon Wheatbelt, Mallee, Esperance Plains and Coolgardie Bioregions in the South-west Botanical Province of Western Australia (Figure 3).

Habitat. In woodland with *Eucalyptus wandoo*, mallee shrubland or low heath with *Casuarina* and *Calothamnus*, on flat, gently undulating plains, in loamy sand over granite, shallow sand on laterite, sandy gravel, pale sandy loam, yellow or white sand, sandy clay, and siliceous sand.

Flowering period. Throughout the year.

Typification. The Western Australian collector James Drummond numbered taxa rather than individual gatherings as such. Often such taxon numbers are preceded by a collection number, as is the case with the holotype of *Eurybia leptophylla*, namely *Drummond* 3/127 (KW) and one of its isotypes, *Drummond* 3/127 (P). The Paris isotype bears the date 1845, as does *Drummond* 127 (CGE), which is thus also taken to be an isotype. Specimens of *Olearia muricata* simply labelled *Drummond* 127 without date are considered here to be possible isotypes of *Eurybia leptophylla*.

Although the isotype of *Eurybia leptophylla* held at P was received from BM no duplicate has been located in the latter collection. Similarly, the isotype of this name held at PERTH was received from TCD where no duplicate has been located.

Affinities. This species was included by Bentham (1867) in *Olearia* sect. *Merismotriche* where it appears most similar to *O. strigosa* (see above for distinguishing features).

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